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(71) Applicant *(for all designated States except US)*: **TETRA LAVAL HOLDINGS & FINANCE S.A.** [CH/CH]; 70, avenue du Général-Guisan, CH-1009 Pully (CH).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **KOCH, Michaël** [DE/CH]; 22, chemin des Raclerets, CH-1284 Chancy (CH). **FABOZZI, Thierry** [CH/CH]; 38, rue de Monthoux, CH-1201 Genève (CH).

(74) Agent: **MICHELI & CIE**; 122, rue de Genève, Case Postale 61, CH-1226 Thônex (CH).

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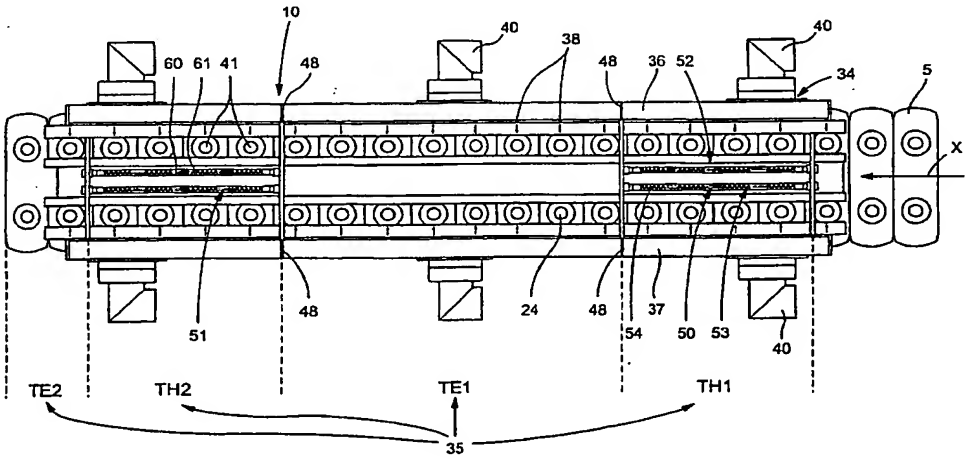
(54) Title: MACHINE FOR THE PRODUCTION OF RECEPTACLES OF PLASTIC MATERIAL AND PROCESS FOR ACTUATING SUCH A MACHINE



(57) Abstract: The machine for production of receptacles comprises a heating device (10) traversed in an indexed manner by at least two rows of preforms (24) disposed on double conveyors (5). The heating device (10) has four successive zones (35) each having a given number of stop positions (41), in which the preforms face ventilation-cooling openings (38). A first zone (TH1) with a heating body (50) is adopted for initial heating; a second zone (TE1) permits thermal balancing; in a third zone (TH2) with a second heating body (51), there is carried out a second heating and the fourth zone (TE2) serves to obtain final thermal equilibrium. The first and third zones (TH1, TH2) have stop positions in which the preforms are subjected simultaneously to heating and a flow of cooling air in a vertical plane. This permits obtaining a precise thermal profile through the wall of the preforms and a particularly effective and rapid heating, whilst avoiding crystallization of the surface of the preforms. The quality and the precision of the receptacles obtained are thus improved.

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

MACHINE FOR THE PRODUCTION OF RECEPTACLES OF PLASTIC MATERIAL AND PROCESS FOR ACTUATING SUCH A MACHINE

The present invention relates to a machine for the production of receptacles of plastic material comprising a body and, arranged along one transport path, at least one device for heating and a device for molding by blowing, the receptacles being formed from preforms moved by transport means along the transport path, the heating device comprising at least four successive zones disposed along the transport path and a ventilation means adapted to send an air flow over the surfaces of the preforms, a first zone comprising means adapted to produce heating of the preforms, a second zone permitting thermal condition balancing of the wall of the preforms by cooling their external surface, a third zone comprising means adapted to produce a second heating of the preforms, a fourth zone permitting final balancing of the thermal conditions of the preforms before their transfer to the blow molding device.

EP 0 387 737 describes a process and device for heating preforms of the mentioned type, comprising four zones,

a heating zone held below the molding temperature of the preforms, a cooling zone, a second heating zone in which the external temperature of the preforms becomes greater than the molding temperature and a fourth balancing zone, at the end of which the external and internal temperatures of the preforms become equal. In the process and device described, the heating zones do not comprise simultaneously means for heating and cooling. The heating periods and zones are followed by periods and zones of cooling/balancing. The preforms pass through these four zones progressively without the zones comprising stations and predetermined stop positions and defined by particular cooling means.

EP 0 251 066 describes a process for heating preforms describing at least an infrared quartz radiant heating of and ensuring an external temperature of the preforms that is higher than the internal temperature of these latter and a radiofrequency oven permitting obtaining an internal temperature higher than the external temperature of the preforms. These latter are then transferred into the molding device. According to a preferred embodiment, the process makes use of successive passage of the preforms through two quartz ovens and a radiofrequency oven without the preforms being subjected to a cooling operation.

U.S. Patent 4,571,173 discloses a process for thermal treatment of the preforms according to which the preforms mounted on a wheel pass before two heating devices, a

cooling device, a third heating device and a fourth cooling device at the outlet of which the temperature through the wall of the preforms becomes substantially uniform. The preforms are then taken up by a transfer wheel which supplies molding cavities, and at the inlet of which the external temperature of the wall of the preforms is slightly lower than the internal temperature.

The present invention has for its object to obtain a heating device for the mentioned machines, which permits very efficacious and rapid heating of the preforms by avoiding a crystallization of the external surface of the preforms, whilst ensuring a predetermined thermal profile through the wall of the preforms.

These objects are obtained thanks to the characteristics recited in the independent claims.

It is thus possible to give the preforms a very high heating energy supply permitting very rapid and efficacious heating whilst avoiding crystallization of the surface of the preforms and obtaining a predetermined thermal profile through the wall of the preforms, which ensures very regular expansion during the subsequent drawing-blowing operation and a high quality of the obtained receptacles.

Preferably, each of the four zones comprises a predetermined number of stop positions in which the preforms are stopped during predetermined time intervals, the ventilation means being arranged in the four zones so as to direct,

for these stop positions, a flow of air that is substantially vertical in the direction of the preforms, which are rotated about their longitudinal axes by means of at least one drive device.

The combined and successive heating-cooling actions and the cooling only in the well-defined stop positions of the preforms, ensure a particularly precise thermal distribution for the preforms, hence very regular molding of the receptacles.

Preferably, the machine is characterized by the fact that the first zone has between 2 and 10, preferably between 4 and 6 stop positions, that the second zone has between 2 and 20, preferably between 6 and 8 stop positions, that the third zone has between 2 and 10, preferably between 4 and 6 stop positions, and that the fourth zone has between 1 and 10, preferably between 2 and 4 stop positions.

By a particular choice of the stop positions in each zone, the general and differential heating of the preforms can easily be adapted to any draw-blow molding application.

According to one embodiment, the machine comprises in the heating device at least two rows of preforms, a ventilation casing being disposed on each side of the two rows and comprising openings in the form of vertical slots disposed at regular intervals corresponding to the distance separating the middles of two successive preforms so as to define said

stop positions, heating bodies being arranged between the two rows of preforms in the first and second zone and each provided with a number of longitudinal substantially superposed heating tubes adapted to emit heating radiation in the direction of the preforms.

These characteristics permit obtaining a very simple construction and a precise and effective heating.

The heating tubes are preferably mounted in an adjustable manner on mounts of the heating device such that the distance separating them from the preforms can be individually adjusted.

Thanks to these characteristics, a particular profile of the temperatures along the axis of the preforms can be obtained.

Preferably, the heating tubes have, along their axes, preferential heating segments located facing said vertical slots of the stop positions.

The heating of the preforms is thus particularly effective and concentrated at the stop positions where it is accompanied by a cooling by means of a well-defined air flow, which avoids in a reliable manner any crystallization of the plastic material adjacent the external surface.

Preferably, the transport means are arranged so as to move the preforms in an indexed manner such that the preforms will be stopped during predetermined time intervals in the stop positions.

This indexed longitudinal transport permits obtaining a particularly well controlled and precise heating of the preforms.

The invention also relates to a process for actuating a machine for the production of receptacles of plastic material, comprising a chassis and, arranged along a transport path, at least one heating device and a blow molding device, the receptacles being formed from preforms moved by the transport means along the transport path, according to which in the heating device the preforms are treated in at least four successive zones arranged along the transport path, that the preforms are heated in a first zone, that the thermal conditions of the wall of the preforms is balanced by cooling their external surface in a second zone, that a second heating of the preforms is effected in a third zone and that a final balancing of the thermal conditions of the wall of the preforms is carried out in a fourth zone, a flow of cooling air being directed against the preforms, characterized by the fact that a flow of air is directed perpendicularly toward the surface of the preforms in the balancing zones and in the two heating zones.

Thanks to these characteristics, it is possible to obtain a very intense heating action whilst avoiding crystallization of the surface of the preforms and whilst obtaining with precision a predetermined thermal profile through the wall of the preforms, thereby ensuring high quality of the

produced products.

The process is preferably characterized by the fact that an indexed movement of the preforms is carried out along the transport path, that the preforms are stopped during a predetermined duration in the stop positions, that there is fixed for each of said zones a number of stop positions, that in these stop positions of the four zones there is directed an air flow substantially vertical in the direction of the preforms, that there is directed in the stop positions of the first and third zones a heating radiation in the direction of the preforms, and that in each of the four zones, the preforms are rotated about their longitudinal axis.

The heating of the preforms thus becomes very precise and permits avoiding an undesired crystallization of the surface of the preform.

Preferably, the process is characterized by the fact that there is carried out a heating and a ventilation such that at the outlet of the second zone and of the fourth zone, the temperature of the external surface of the preforms is below that of the internal surface of the preforms.

Thanks to these characteristics, there is ensured a blowing-drawing operation that is particularly regular and receptacles of high quality.

Other advantages will become apparent from the characteristics set forth in the dependent claims and in the description hereafter explaining the invention in greater

detail with the help of drawings which show schematically and by way of example one embodiment.

Figures 1 and 2 are side and plan views of this embodiment.

Figures 3 and 4 are plan and transverse cross-sectional views of the heating device integrated into this embodiment.

Figure 5 is a diagram showing the temperature of the external surface Tex of the preforms and the internal temperature Tin of the internal surface of the preforms, as a function of time t.

With reference to Figures 1 and 2, the machine for the production of receptacles of plastic material comprises a chassis 1 on which the different devices and members of the machine are mounted in a modular fashion. The removable external walls 2 comprise doors 3 permitting isolating the interior of the machine from the exterior and assuring rapid access for maintenance of the machine. Preforms for receptacles to be produced are supplied from a loading device 4 and disposed pairwise neck down on double conveyors 5 adapted each to carry two preforms.

These double conveyors 5 with their two preforms are then driven by a jack 6 through a heating device 10 while forming two rows of preforms, the long side of the conveyors 5 being perpendicular to the direction of movement.

At the outlet of the heating device 10, the last

conveyor is pushed perpendicularly to the rows by a jack (not shown) in a drawing-blowing device 12 comprising two mold cavities in which the receptacles are formed by drawing-blowing. After the formation of the receptacles, the conveyors 5 with their receptacles 14 are rotated 90E on a rail 15, the long side of the conveyors being parallel to the direction of movement. A jack 15 then pushes the conveyors 5 toward a discharge device with inversion at 18, which places the receptacles 14 neck up on the double rail 14 on which these receptacles 14 leave the machine for their future use, for example in packaging, handling, sterilization, filling, labeling stations, etc. The empty conveyors 5 then follow a rail for a quarter of a circle to arrive at the loading device 4.

The conveyors 5 are constituted by plates 20 (Figure 4) of elongated rectangular shape with rounded ends, comprising two recesses 21 in which supports 22 for preforms 24 are maintained. These plates rest on a guide track 25 comprising at least one rail 26. The preforms 24 are disposed neck down in the upper portion of the supports 22, which comprise a tubular portion 27 with an axial blowing channel 28. The two recesses 21 of the plates 20 form bearings thanks to which the supports 22 can turn about their axis. These supports 22 can turn about their axis. These supports 22 are provided at their lower end with a drive pinion 29 adapted to coact with a drive device 30 provided in the heating device

10. This drive device 30 comprises for each row of supports 22 and preforms 24, at least one drive chain 31 mounted on pinions (not shown), driven by means of an electric motor 32.

The heating device 10 is shown in Figures 3 and 4 to comprise four zones 35 arranged following each other in the direction of movement x, namely a first heating zone TH1, a first balancing zone TE1, a second heating zone TH2 and a second balancing zone TE2.

A ventilation installation 34 comprises ventilation casings 36, 37 disposed on each side of these zones 35. These casings are provided with a certain number of openings, in the form of ventilation slots 38 arranged vertically so as to generate vertical flow planes 39 of cooling air directly against the preforms 24 stopped facing the slots 38 in predetermined stop positions or stations.

The ventilation casings 36, 37 are supplied with cooling air by conduits 40.

Preferably, the two casings 36, 37 comprise vertical separation walls 48 permitting obtaining for the zones TH1, TE1 and the assembly of two zones TH2 and TE2, separate ventilation compartments individually supplied by the conduits 40. Thus, it is possible to obtain a different ventilation and cooling action for certain of the four zones. The conduits 40 can be supplied individually with air at different temperatures from the ambient air and/or from an air conditioning installation (not shown). The air of the zones

could in certain cases equally be preheated.

The ventilation installation 34 moreover comprises a central ventilating conduit 42 disposed between the upper portions of the supports 22 of the two rows (Figure 4). Through suitable openings 43, air flows are directed in the direction of supports 22 and the mix of preforms 24 to avoid prejudicial heating of these portions. The casings 36 and 37 are mounted on a frame 45 secured to the chassis 1 of the machine. This frame 45 has upper cross-pieces 46 permitting the suspension of the central ventilation conduit 42 by means of vertical suspension bars 47.

The heating device 10 comprises two heating bodies 50, 51 mounted between the two rows of preforms in the heating zones TH1 and TH2. Each of these heating bodies is suspended from the cross-pieces 46 and comprises two series 52, 53 of eight longitudinal heating tubes 54, substantially superposed. All or least the three upper ones and the two lower ones of the heating tubes are adjustably mounted in a direction perpendicular to the preforms 24 so as to be able individually to adjust the distance separating the heating tubes 54 from the preforms 24. Each heating tube comprises for this purpose at its two ends adjustment screws disposed in slots provided in the vertical suspension bars 47 on which the heating tubes 54 are mounted.

Preferably, the heating tubes 54 comprise a heating element 60 having preferential heating segments 61 located

facing the ventilating slots 38 (Figure 3). Thus, these slots 38 and the segments 61 define said stop positions 41 for the preforms, which are moved in an indexed fashion thanks to the jack 6. The stop positions 41 are separated from each other by an interval corresponding to the distance separating the middles of two conveyors 5 and successive preforms 24.

Of course the duration of dwell of a preform in one of the zones 35 depends on the one hand on the time interval of the stopping in the stop positions and on the other hand on the length of the zone, hence on the number of stop positions 41. Thus, the first heating zone TH1 comprises between 2 and 10 stop positions, preferably between 4 and 6. In this zone, the wall of the preform is heated intensely and the temperature of the external surface increases more rapidly than that of the internal surface.

The following zone, which is the first balancing zone TE1, comprises between 2 and 20, preferably between 6 and 8 stop positions located facing ventilation slots 38. This zone has no heating body. This permits balancing of the temperature through the wall of the preform given that the external surface is subject to more intense cooling than the internal surface of the wall of the preform. In the second half of this zone, the temperature is even inverted because the external surface of the wall of the preform becomes colder than the internal surface.

The following zone corresponds to the second

heating zone TH2 and has a heating body 51 similar to that of the zone TH1, given of course that the adjustment of the heating tubes can be different in the two zones. In this zone, the heating permits obtaining a temperature profile along the preform. The temperature of the external surface becomes again higher than that of the internal surface. This zone comprises between 2 and 10, preferably between 4 and 8 stop positions located between the ventilating slots 38 and the segments 31 with preferential heating. The heating in the first zone TH1 is substantially more intense than that in the second zone TH2 designed above all for profiling the temperature along the preforms.

This zone is followed by a second balancing zone TE2 without a heating body. As will be seen in Figure 3, this zone can be partially free from ventilation. It comprises between 1 and 10, preferably between 2 and 4 stop positions. This then permits supplemental adjustment between the external and internal temperatures of the preform just before the latter is introduced into the drawing-blowing device 12. Thus, the external surface becomes again slightly lower than the internal surface temperature.

Thanks to the ventilation and simultaneous heating in the stop positions of the heating zones TH1 and TH2, it is possible to apply very intense heating radiation whilst avoiding crystallization of the surface of the preforms. The transport means, in the form of the jack 6, are for this

purpose arranged so as to move the preforms 24 in an indexed manner such that the preforms will be stopped during predetermined intervals in the stop positions.

The rotation of the preforms 24 and of their support 22 about their axis is obtained thanks to the drive device 30. This rotation can also be of an indexed nature, there could be provide a drive device for each zone TH1, TE1, TH2, TE2, which then permits a different speed of rotation for each zone.

There could also be provided a different drive device for two or three zones together. The longitudinal movement step by step in the direction x is also indexed such that the preforms are stopped during predetermined intervals in the precise positions facing the ventilation slots 38.

As the dwell time of a preform in a given zone 35 is proportional to the number of stop positions that this zone comprises, there is obtained for the embodiment of Figure 3 the following relative dwells for each zone: $T_{TH1} = 0.5T_{TE1} = T_{TH2} = 2T_{TE2}$. Other relative dwells could of course be provided. The very precise air blowing during these phases of heating and balancing ensures efficacious protection of the surface of the preform against any undesired crystallization. The blowing of air on the neck of the preform 24 and the upper portion of the support 22 permits avoiding deformation of the neck of the preform.

It is to be noted that at the outlet of the heating

device 10, the temperature of the external surface of the preforms is below that of the internal surface, which is favorable for precise molding in the drawing-molding device given that the internal surface traverses a greater distance than the external surface of the preform during molding.

Figure 5 shows the development of temperatures of the external surface Tex and of the internal surface Tin of the wall of the preforms. Notice the sharp increase of the temperatures in the first zone TH1 with a greater slope for the temperature of the external wall.

In the balancing zone TE1, the temperature of the external surface drops markedly below the temperature of the internal surface. The increase of the temperatures is less in the profiling zone TH2 with a more pronounced slope for the temperature of the external surface which becomes again higher than that of the internal surface. Finally, the temperatures of the external and internal surfaces are again inverted in the second balancing zone TE2 so as to obtain an optimum difference Tin-Tex for the draw-blow molding.

Of course the embodiment described above is not limiting in any way and can be the subject of all desirable modifications within the scope defined by claim 1. In particular, the machine could have a number n of parallel heating devices 10 comprising 2n rows of preforms. The number of stop positions of each zone could be different. The machine could have more than four processing zones, for

example 6 zones with two final heating and balancing zones. The machine could also be adapted to the production of other hollow bodies than receptacles in the strict sense.

CLAIMS

1. Machine for the production of receptacles of plastic material comprising a chassis (1) and, arranged along a transport path, at least one heating device (10) and a blow-molding device (12), receptacles being formed from preforms (24) moved by transport means (6) along the transport path, the heating device (10) comprising at least four successive zones (35) disposed along the transport path and ventilation means adapted to send an air flow against the surface of the preforms, a first zone (TH1) comprising means (50) adapted to produce heating of the preforms (24), a second zone (TE1) permitting balancing of the thermal conditions of the wall of the preforms (24) by cooling their external surface, a third zone (TH2) comprising means (51) adapted to produce a second heating of the preforms, a fourth zone (TE2) permitting final balancing of the thermal conditions of the preforms (24) before their transfer to the blow-molding device, characterized by the comprised presence of ventilating means in the heating zones (TH1, TH2) and in the balancing zones (TH1, TH2), the ventilation means (34) being arranged so as to send an air flow (39) oriented to the surface of the preforms in the balancing zones (TE1, TE2) and in the heating zones (TH1, TH2).

2. Machine according to claim 1, characterized by

the fact that each of the four zones (TH1, TE1, TH2, TE2) comprises a predetermined number of stop positions (41) in which the preforms (24) are stopped during predetermined time intervals, the ventilating means being arranged in the four zones so as to direct in the stop positions (41) a flow of air substantially vertical in the direction of the preforms, which are rotated about their longitudinal axis by means of at least one drive device (30).

3. Machine according to claim 1 or 2, characterized by the fact that the four zones (35) are arranged to heat and ventilate the preforms such that at the outlet of the second zone (TE1) and of the fourth zone (TE2) the temperature of the external surface of the preforms (24) is below that of the internal surface of the preforms (24).

4. Machine according to claim 2, characterized by the fact that the first zone (TH1) has between 2 and 10, preferably between 4 and 6 stop positions (39), that the second zone (TE1) has between 2 and 20 preferably between 6 and 8 stop positions, that the third zone (TH2) has between 2 and 10, preferably between 4 and 6 stop positions, and that the fourth zone (TE2) has between 1 and 10, preferably between 2 and 4 stop positions.

5. Machine according to claim 2, characterized by the fact that it comprises in the heating device (10) at least

two rows of preforms (24), a ventilating case (36, 37) being disposed on each side of the two rows and comprising openings (38) in the form of vertical slots disposed at regular intervals corresponding to the distance separating the middles of the successive preforms (24) so as to define said stop positions (41), heating bodies (53) being arranged between the two rows of preforms in the first and third zone (TH1, TH2) and each provided with a number of longitudinal heating tubes (54) substantially superposed and adapted to emit heating radiation in the direction of the preforms.

6. Machine according to claim 5, characterized by the fact that the heating tubes (54) are mounted adjustably on mountings of the heating device (10) such that the distance separating the preforms (24) can be individually adjusted.

7. Machine according to claim 5, characterized by the fact that the heating tubes (54) have on their axis segments (61) with preferential heating located facing said vertical slots (38) and stop positions (41).

8. Machine according to one of claims 5 to 7, characterized by the fact that the ventilation means comprise a ventilation conduit (42) arranged between the two rows of preforms (24) below the heating body (53) and having openings (43) adapted to direct a flow of air in the direction of the necks of the preforms (24) and supports (22) on which the

preforms are disposed neck down.

9. Machine according to claim 2, characterized in that it comprises between two and four drive devices (30) for rotating the preforms, adapted to drive the preforms, located in one, two or three of said zones (TH1, TE1, TH2, TE2).

10. Machine according to claim 2, characterized by the fact that the transport means (6) are arranged so as to move the preforms (24) in an indexed manner such that the preforms will be stopped during predetermined time intervals in the stop positions.

11. Machine according to claim 2 or 9, characterized by the fact that the drive device or devices (30) are arranged so as to rotate the preforms (24) in an indexed manner.

12. Machine according to claim 5, characterized by the fact that each of the ventilating casings (36, 37) comprises separation walls (48) adapted to separate the ventilating compartments and arranged between the first, second and third zone (TH1, TE1, TH2) at least each of the compartments comprising a supply conduit (40) for ventilating air.

13. Process for actuating a machine for the production of receptacles of plastic material comprising a

chassis (1) and, arranged along a transport path, at least one heating device (10) and a blow-molding device (12), the receptacles being formed from preforms (24) moved by transport means (6) along the transport path, according to which the preforms are treated in the heating device (10) in at least four successive zones (35) arranged along the transport path, that the preforms are heated in the first zone (TH1), that the thermal conditions of the wall of the preforms (24) is balanced by cooling their external surface in a second zone (TE1), that there is produced a second heating of the preforms in a third zone (TH2) and that a final balancing of the thermal conditions of the wall of the preforms (24) is carried out in a fourth zone (TE2), a cooling air flow being directed against the preforms, characterized by the fact that an oriented flow of air (39) is directed toward the surface of the preforms in the balancing zones (TE1, TE2) and in the two heating zones (TH1, TH2).

14. Process according to claim 13, characterized by the fact that there is carried out an indexed displacement of the preforms (24) along the transport path, that the preforms are stopped for a predetermined dwell in the stop positions (41), that there is fixed for each of said zones a number of stop positions (41), that there is directed in these stop positions of the four zones a flow of air (38) substantially vertical in the direction of the preforms (24),

that there is directed in the stop positions of the first and third zones a heating radiation in the direction of the preforms, and that in each of the four zones the preforms are rotated about their longitudinal axis.

15. Process according to claim 14, characterized by the fact that there is carried out an indexed rotation of the preforms about their longitudinal axis.

16. Process according to one of claims 13 to 15, characterized by the fact that there is carried out a heating and a ventilation such that at the outlet of the second zone (TE1) and of the fourth zone (TE2), the temperature of the external surface of the preforms (24) is below that of the internal surface of the preforms (24).

fig.1

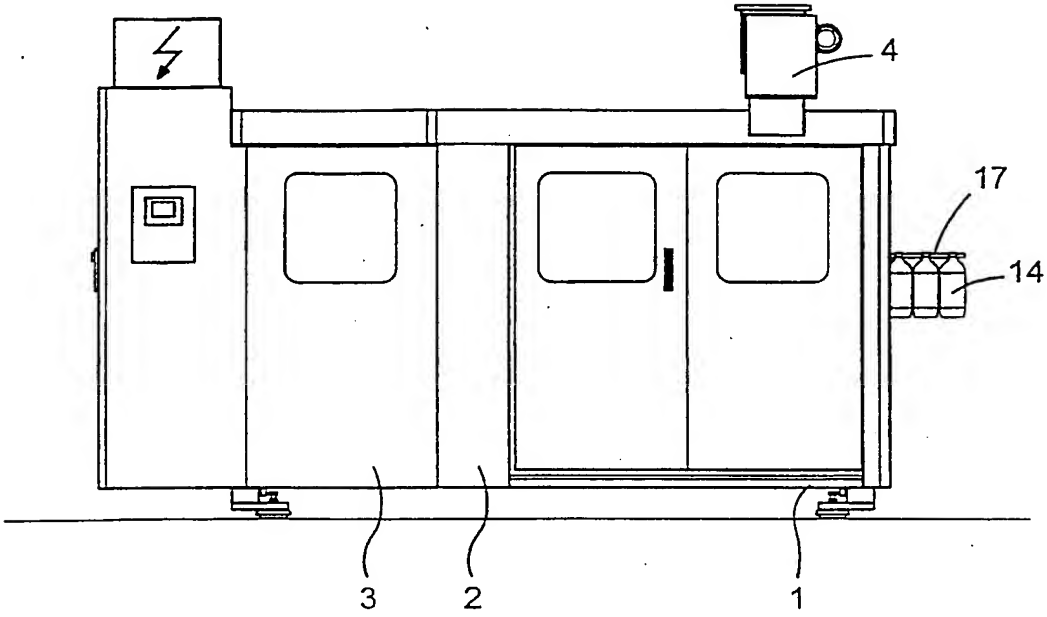
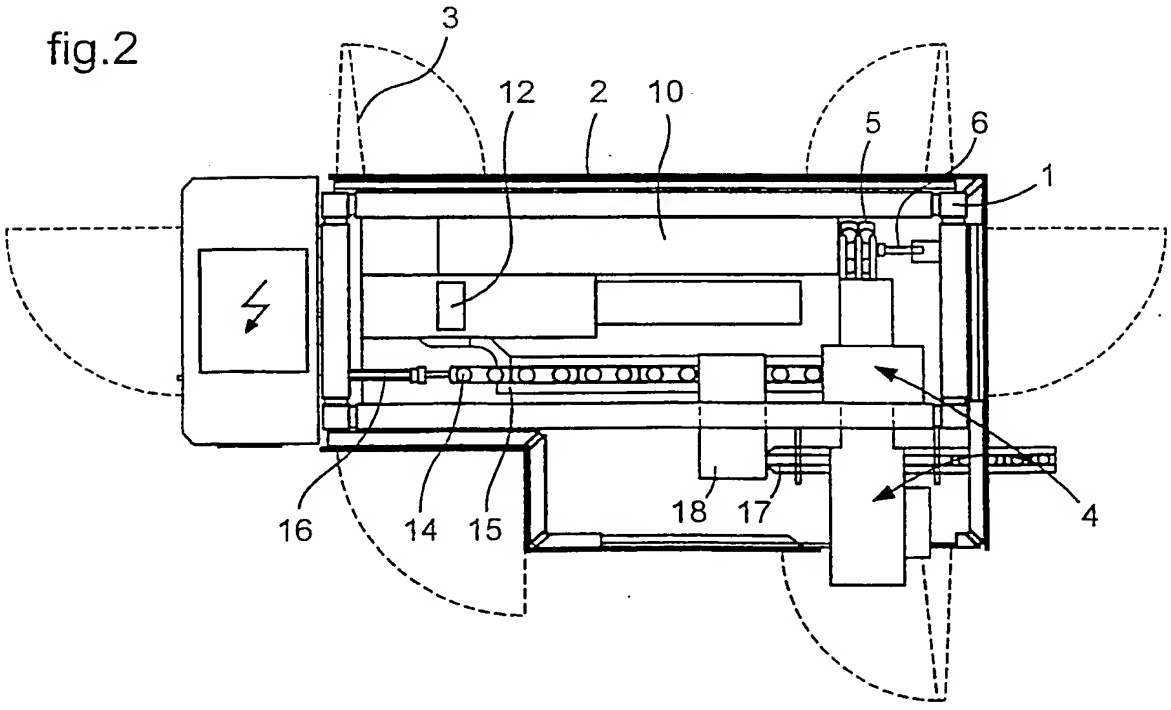


fig.2



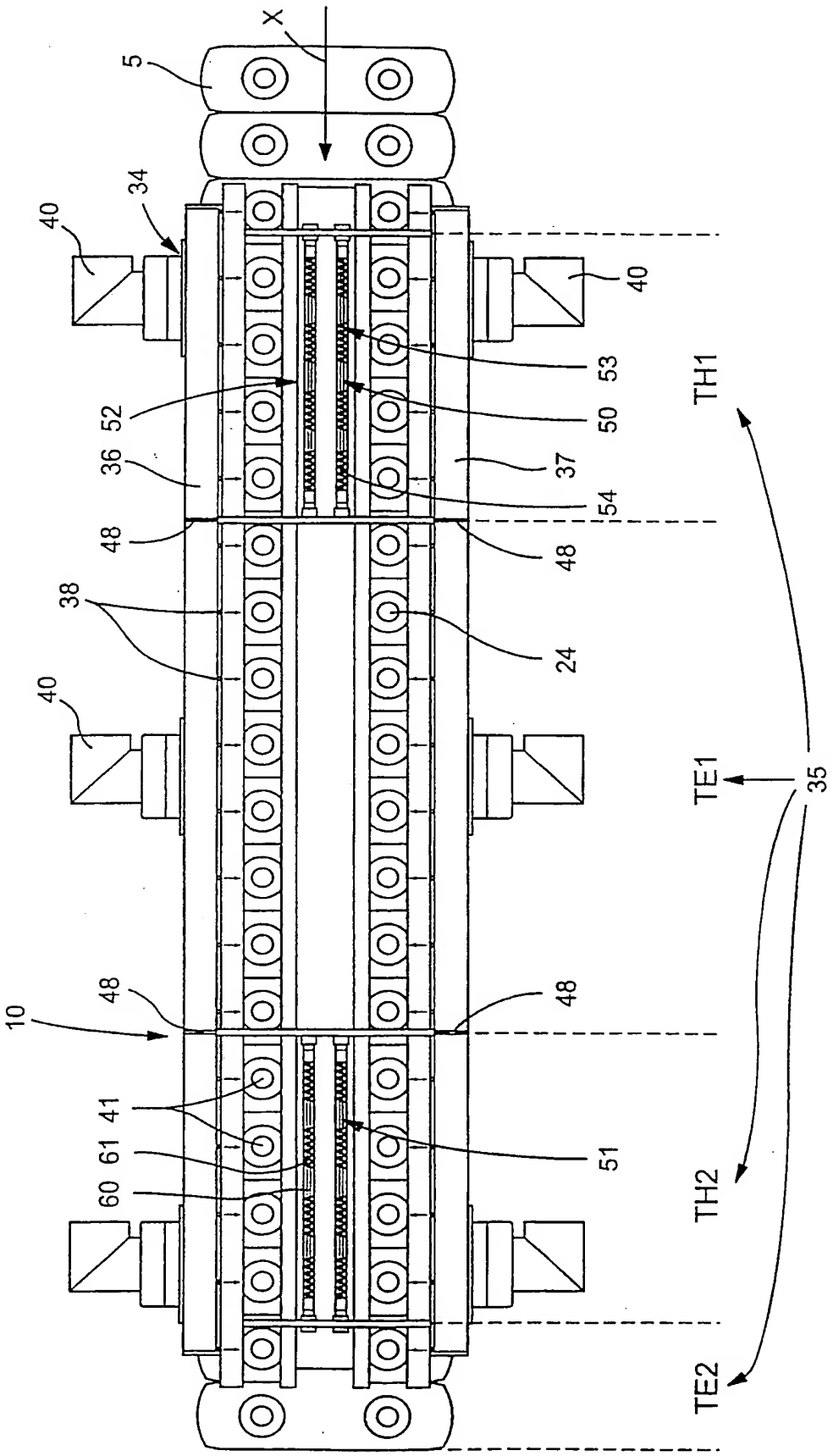
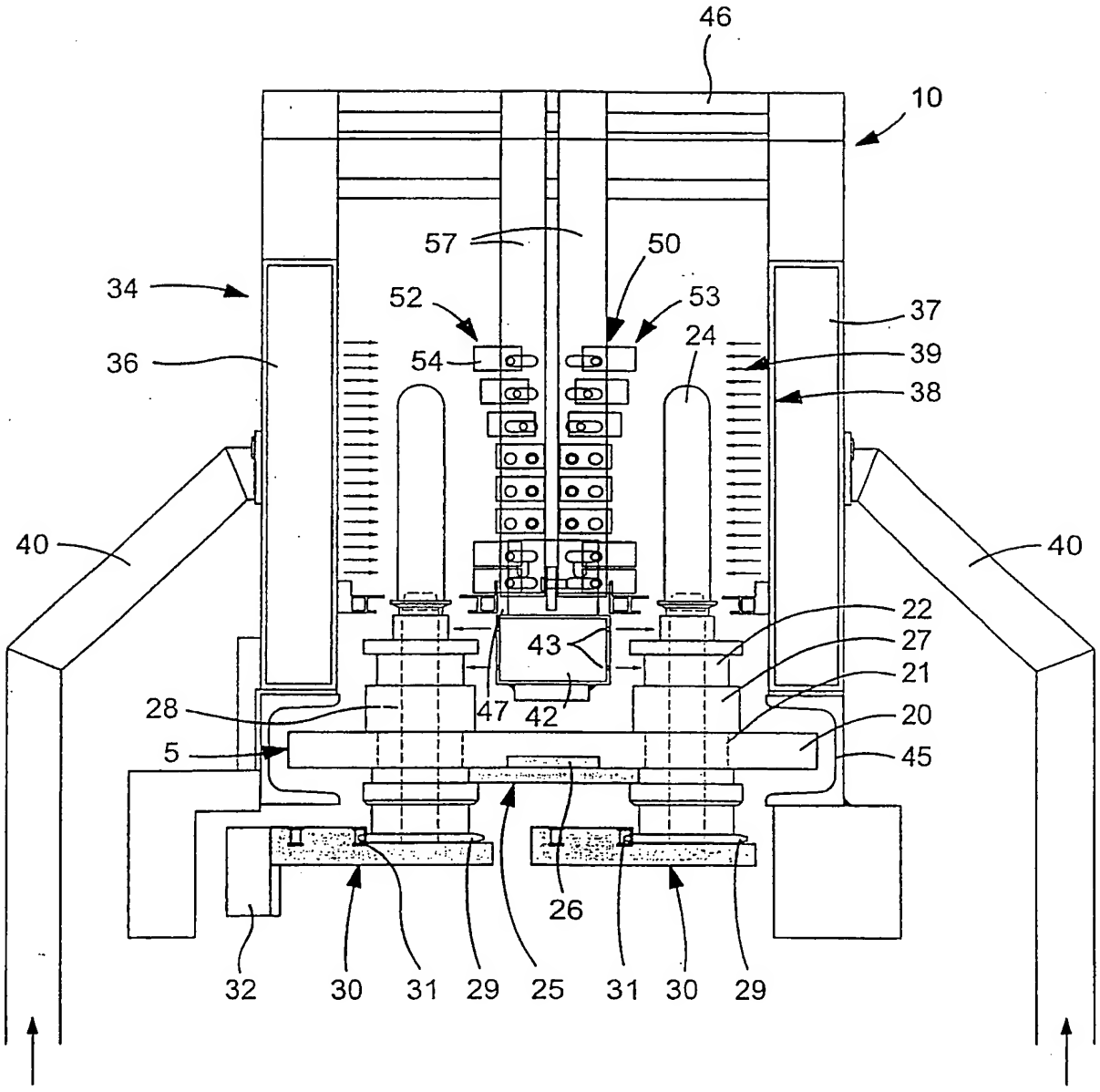


fig.3

fig.4



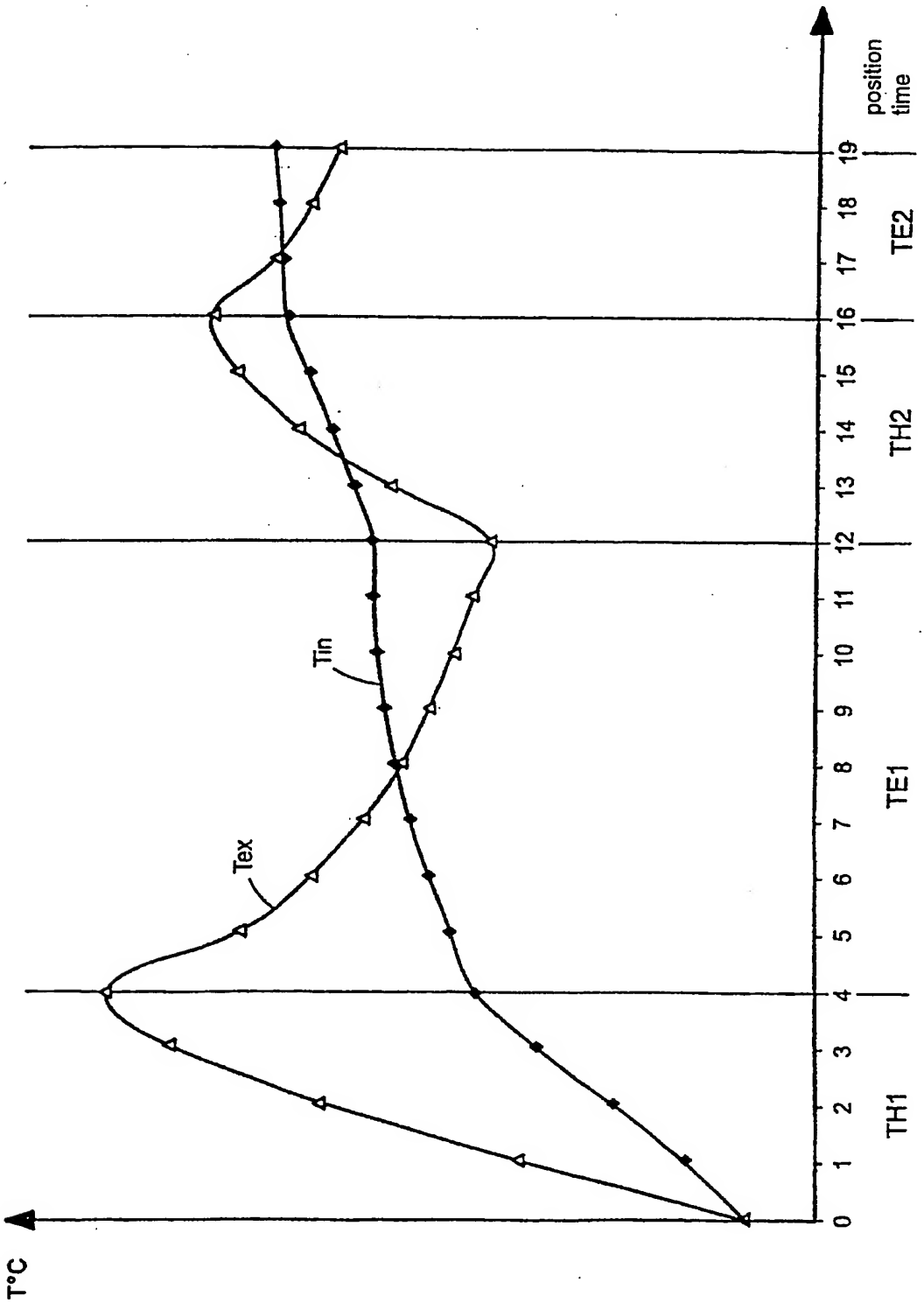


fig.5

INTERNATIONAL SEARCH REPORT

Internal Application No
PCT/IB 00/01251

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B29C49/64

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B29C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 387 737 A (BEKUM MASCHF GMBH) 19 September 1990 (1990-09-19) column 2, line 17 -column 3, line 52; claims 1,3; figures 2,3 column 4, line 52 - line 57 ---	1-3, 13-16
X	EP 0 251 066 A (CONTINENTAL PET TECHNOLOGIES) 7 January 1988 (1988-01-07) abstract; figure 7 ---	1,2,13
X	US 4 571 173 A (CHANG LONG F ET AL) 18 February 1986 (1986-02-18) figures ---	1,2,4,5, 9,10,13
A	US 5 980 229 A (COLLOMBIN ANDRE-MARCEL) 9 November 1999 (1999-11-09) figures 2,3 ---	1-3, 13-16

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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9 November 2000	17/11/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Kosicki, T

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INTERNATIONAL SEARCH REPORT

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